

**Research Article****Prevalence of Eye Abnormalities in School Going Children in Amritsar -A Study Conducted By a Tertiary Eye Care Centre in an Urban School****Gupta K<sup>1</sup>, Singh K<sup>2</sup>, Aggarwal A<sup>2</sup>, Gupta A<sup>2</sup>, Bansal P<sup>1</sup>**<sup>1</sup>BPS GMC for Women, Khanpur Kalan, Sonapat, Haryana, India<sup>2</sup>Regional Institute of Regional Institute of Ophthalmology, Amritsar, Punjab, India**\*Corresponding author**

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**Abstract:** Untreated ocular morbidity in schoolchildren is an important condition which can hamper the best intellectual development and academic performance of children. The study was designed to describe the distribution of ocular morbidity due to various causes in a representative sample of urban schoolchildren in Amritsar and to provide free of cost referral and curative intervention at Regional Institute of Ophthalmology, Government Medical College, Amritsar. The methods in this study complete eye examination including visual acuity, ocular alignment and fundus exam was carried out in all children by a dedicated team of Ophthalmologists. Students with uncorrected refractive errors and other ocular morbidities were followed up at RIO, GMC Amritsar. In this study the results were Among the 500 children examined 300 were boys and 200 were girls in the age group of 5-12 years. 15.2% students were using prescription spectacles. 40 (8%) students had uncorrected refractive errors of which astigmatism was most common. 6 (1.2%) students had amblyopia. 5 had unilateral amblyopia and 1 had bilateral amblyopia. The most frequent causes of amblyopia (4 students) were refractive errors. 4(0.8%) had strabismus. 1 student had coloboma of the choroid. 2 students had features (conjunctival xerosis and bitot spots) suggestive of vitamin A deficiency. There was no significant difference in gender distribution of ocular morbidities ( $p>0.05$ ) in the schoolchildren examined. In conclusion the prevalence of untreated ocular morbidity in the present study was 10.6% (53 students). There was no significant difference in gender distribution. 98.1% of the ocular morbidity was correctable. In view of the above facts, this kind of school screening cum prevention, promotion, and treatment programme with follow-up seems to be appropriate to reduce ocular morbidity in schoolchildren..

**Keywords:** schoolchildren, morbidity, Amritsar, amblyopia.

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**INTRODUCTION**

Visual impairment in schoolchildren is an important condition which can hamper the best intellectual development and academic performance of children. In multiple studies and screening programmes conducted across nations a huge burden of visual impairment most commonly due to refractive errors has been described in both developed and developing nations [1].

Tananuvat N *et al.*; described an 8.7 % prevalence of refractive errors in school children in Chiang Mai (Thailand). They observed a 4.2 % prevalence of abnormal color vision, along with prevalence of strabismus of 6.2%, and of amblyopia of 1.4%. Most cases of amblyopia were due to uncorrected refractive errors [2]. Mehari ZA *et al.*; reported 9.5 per cent prevalence of visual impairment with 6.3% prevalence of refractive errors in Ethiopian schoolchildren. Myopia was the most prevalent refractive error; accounting for 6.0 per cent, followed

by compound myopic astigmatism 1.2 per cent, then simple myopic astigmatism 0.5 per cent, mixed astigmatism 0.26 per cent and finally hyperopia 0.33 per cent. Reasons for visual acuity of 6/12 or worse in the better eye were found to be refractive error (65.9 per cent), corneal problems (12.8 per cent) and amblyopia (9.6 per cent). The prevalence of manifest strabismus in the study group was 1.1 per cent [3].

Robaei D *et al.*; observed uncorrected visual impairment in the better eye of 1.3% children and worse eye of 4.1% children in 6 year old Australian schoolchildren. The prevalence was higher in girls than boys and among children of lower socioeconomic status. Refractive error was the most frequent cause of visual impairment, accounting for 69.0%, followed by amblyopia (22.5%). Astigmatism was the principle refractive error causing visual impairment and was frequently uncorrected. Presenting visual impairment (using current glasses if worn) was found in the better

and worse eyes of 0.9% children and 2.8% children respectively. This was mainly due to under corrected or uncorrected refractive error [4].

Fotouhi A *et al.*; reported prevalence of amblyopia at 1.88% in 7 year old Iranian schoolchildren. Among these cases, 60.30% were unilateral. Also, 61.9% were strabismic, 27.0% were anisometropic, 9.5% were isometropic, and 1.6% was due to congenital cataracts [5]. Rustagi *et al.*; reported low vision (visual acuity < 20/60) in the better eye was observed in 2.9% children and blindness (visual acuity <20/200) in (0.9%) children in rural schoolchildren in Delhi[1]. Chin MP *et al.* reported ocular morbidities in 40% schoolchildren in China. The prevalence of "clinically-significant myopia" ( $\leq -0.50$  dioptries) was 27%, 18% and 13% in Han, Hui and Uyghur children, respectively. In contrast, Uyghur students had the highest prevalence of astigmatism (Uyghur 12%, Han 5%, Hui 4%). The overall spectacle coverage was 36% [6]. Vyas DB *et al.*; screened 5- to 7-year-old Asian-Pacific Islander schoolchildren in Southern California and found myopia (8.9%) and astigmatism (15.8%) as the majority of visual disorders. Color-vision deficiency was prevalent among 2.8% of male children, extra-ocular muscle imbalance among 3.0% of children, and amblyopia among 1.0% of children. All other conditions were present in less than 4% of children screened [7].

Globally, a huge burden of uncorrected/unaided refractive errors has been reported in multiple surveys conducted among school aged children in both Asiatic and other nations. (India: 2.63-7.4% [8-12] ; Nepal: 8.1% [13] ; Pakistan: 8.9% [14]; Malaysia: 17.1% [15] ; Iran: 3.8% [5]; South Africa:1.4% [14]; Brazil: 4.82% [16] ; Australia: 10.4% [4] ; Chile: 15.8% [17].

Common eye problems in children include refractive errors, amblyopia, squint, vitamin A deficiency, ocular injuries and allergic conjunctivitis. Less common problems include congenital cataract, colour blindness, glaucoma, cornea/optic nerve/retinal disease etc. There is a paucity of studies among the school children of India to assess the burden of visual impairment. Uncorrected refractive errors are a major public health problem among school children in India. In the first 12 years of life 80% of learning comes through vision. Further failure to diagnose and manage amblyopia before the age of 7 years can result in life-long visual impairment [18]. This emphasizes the importance of early detection and treatment of ocular diseases and visual impairment in young children. Screening for visual impairment and identification of the children suffering from refractive errors and other ocular morbidities and encouraging them to take corrective measures can therefore play an important role in preventing longterm visual disability.

While most government programs focus on rural areas this study was designed to find the prevalence of refractive errors, strabismus, amblyopia and other vision impairing ocular diseases in an urban school in Amritsar by a dedicated team of ophthalmologists from a tertiary eye care center and to encourage free of cost treatment wherever required at RIO, GMC Amritsar.

## MATERIAL & METHODS

The Study conducted was at a private school and Regional Institute of Ophthalmology, Government Medical College (RIO-GMC), in Amritsar. Total 500 children were examined after taking consent from the guardians. Institutional ethical clearance and appropriate permissions from the school authorities was taken. Students examined were able to understand and follow instructions while doing refraction testing and could be easily examined. They were also able to explain the proceedings to their parents for taking consent. A predesigned, questionnaire was used for collecting identification data and information on visual acuity and spectacle use. Complete eye examination of both eyes was carried out in all students and free of cost referral and treatment was provided at RIO-GMC, Amritsar.

Eye examination of each student included:

- Torch light examination of the eye & adnexa
- Visual acuity for distance vision - separately for each eye with a Snellen chart at distance of 6 m. In children already prescribed spectacles, visual acuity was tested with glasses
- Visual acuity for near vision - separately for each eye with a Snellen near vision chart at distance of 25 cm. In children already prescribed spectacles, visual acuity was tested with glasses
- Visual acuity was tested by a single experienced optometrist to avoid inter-observer variation
- Ocular deviation (phoria and tropia)-determined using the cover test
- Fundus examination using direct ophthalmoscopy
- Students having visual acuity 6/9 or less were further evaluated at tertiary health care centre (RIO GMC Amritsar). These students underwent cycloplegic refraction. In age group of 6-10years homatropine was used and in age group >10 years cyclopentolate was used for cycloplegic refraction and fundus examination. Retinoscopy and post mydriatic test were carried out in all such students. Children were given final prescription based on post mydriatic test and subjective acceptance.
- Amblyopic children were given full refractive correction. Amblyopic patients were called for follow up every 3 months. Patching was advised when best corrected visual acuity <6/12 & as per age.

- Students & their parents were taught convergent exercises in students with anomalies of convergence at tertiary health care centre (RIO GMC Amritsar)
- Students with other eye abnormalities like strabismus, coloboma etc. were referred and treated at tertiary health care centre (RIO GMC Amritsar)

The data collected was compiled and statically analyzed using Microsoft Excel and SPSS ver. 20 programs.

### OBSERVATIONS

Among the 500 children examined 300 were boys and 200 were girls in the age group of 5-12 years. The findings and sex distribution of ocular morbidities are summarized in table 1.76 (15.2%) students were using prescription spectacles. Of these students 38(50%) had astigmatism, 25 (32.8%) had myopia and had 13 (17.1%) hypermetropia. Of the students with astigmatism 24 had simple myopic astigmatism, 10 students had simple hypermetropic astigmatism and 4 had compound astigmatism.

The distribution of untreated ocular morbidities is shown in Figure 1. 40 (8%) students had uncorrected refractive errors. Of these 40 students 18 had astigmatism (10 had simple myopic astigmatism, 6 had simple hypermetropic astigmatism and 2 had compound astigmatism). 12 students had myopia and 10 students had hypermetropia (Figure 2).

6 (1.2%) students had amblyopia. 5 had unilateral amblyopia and 1 had bilateral amblyopia. The most frequent causes of amblyopia (4 students) were refractive errors (including anisometropic astigmatism >1.50 D in 3 students and isometropic astigmatism >2.50 D in one student). 2 had stimulus deprived amblyopia of which one student had ptosis and other had congenital cataract. These students were prescribed spectacles following cycloplegic refraction and post mydriatic test.

On assessing the severity of refractive errors 5 students had corrected myopia of >6.0D and one student had uncorrected myopia of >6.0D. In students having astigmatism 38 had astigmatic refractive error of >1.0 D. Of these 15 had uncorrected astigmatism. 15 students had hypermetropia with refractive error > 1.5D, of which 7 had uncorrected hypermetropia.

4(0.8%) had strabismus. 2 students had alternating convergent squint and 2 had accommodative esotropia. On follow up one student with alternating convergent squint required surgical management. Rest were managed with refractive correction and orthoptic exercises. 1 student had coloboma of the choroid. 2 students had features (conjunctival xerosis and bitot spots) suggestive of vitamin A deficiency. They were given intramuscular vitamin A followed by oral vitamin A therapy and nutritional counselling. There was no significant difference in gender distribution of ocular morbidities ( $p>0.05$ ) in the schoolchildren examined.

**Table 1: Description and distribution of ocular morbidities in male and female students**

Type of ocular morbidity	Number of male students (n=300)	Number of female students (n=200)	
Prescription spectacles	45 (15%)	31(15.5%)	76 (15.2%)
Astigmatism	22 (7.3%)	16 (8%)	38 (7.6%)
Myopia	16 (5.3%)	9 (4.5%)	25 (5%)
Hypermetropia	7 (2.3%)	6 (3.6%)	13 (2.6%)
Uncorrected refractive errors	27 (9%)	13(6.5%)	40 (8%)
Astigmatism	12 (4%)	6 (3%)	18 (3.6%)
Myopia	7 (2.3%)	5 (2.5%)	12 (2.4%)
Hypermetropia	8 (2.7%)	2 (1%)	10 (2.0%)
Amblyopia (cause)	4 (1.3%)	2 (1%)	6 (1.2%)
Refractive error	3 (1%)	1 (0.5%)	4 (0.8%)
Stimulus deprived	2 (0.6%)	0	2 (0.4%)
Strabismus	1 (0.3%)	3 (1.5%)	4 (0.8%)
Coloboma	1 (0.3%)	0	1 (0.2%)
Vitamin A deficiency	0	2 (1%)	2 (0.4%)

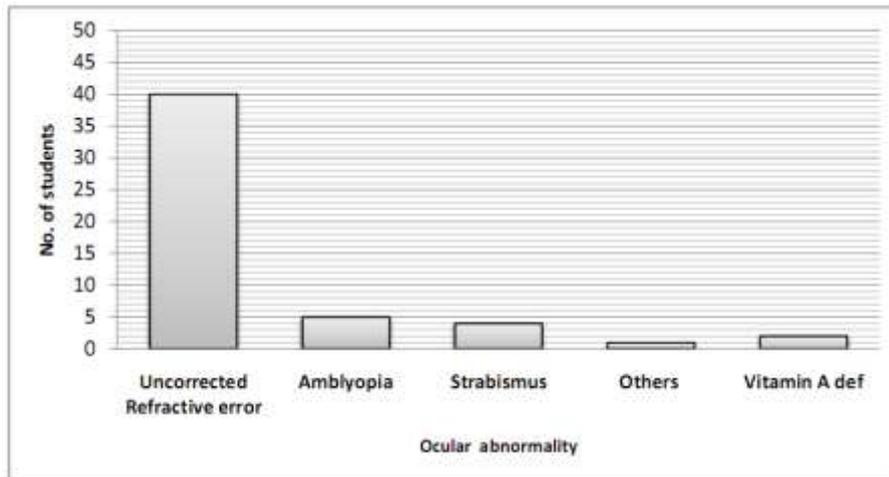


Fig 1: Distribution of untreated ocular morbidities in schoolchildren covered in the present study

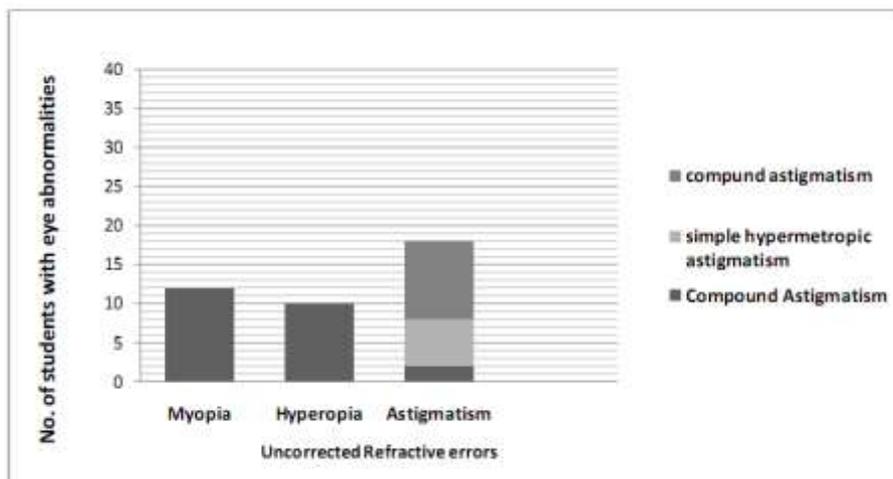


Fig 2: Types of uncorrected refractive errors in schoolchildren covered in the present study

**DISCUSSION**

Uncorrected refractive errors are the main cause of impaired vision in schoolchildren even in urban areas. The prevalence of uncorrected refractive errors in the present study was 8%. This is similar to the prevalence reported in other studies [8-12]. In both students having prescription glasses as well as in students with uncorrected refractive errors, astigmatism was the most common cause. In students with astigmatism, simple myopic astigmatism was the most common. The prevalence was similar in girls and boys. Similar pattern is seen in other studies [1, 13]. The prevalence of amblyopia was 1.2% of which most common cause was uncorrected refractive errors. This is similar to the prevalence reported in a study from Iran [19]. This is significant as failure to diagnose and manage amblyopia before the age of 7 years can result in life-long visual impairment [18]. The prevalence of myopia >6.0D in 1.2% (6 students), astigmatism > 1.0D in 7.6% (38 students) and hypermetropia >1.5D in 3% (15 students) is significant as these students may have difficulty in spectacle acceptance and use and need regular follow up. 0.8% (4 students) has strabismus. This is less than the prevalence in most other studies probably due to the limited sample size or urban nature

of our study group [1, 13]. Only 2 students (0.4%) had vitamin A deficiency features. Again the prevalence may be low due to the urban nature of subjects and partly due to on-going government programmes in curtailing vitamin A deficiency. Still it stresses the need for nutritional training and awareness of parents and children.

The present study shows that majority of the ocular morbidities in schoolchildren are treatable on early detection. The data from the present study in an urban private school indicates that there is a shortage of basic eye care and health awareness in parents and teachers even in urban areas. It emphasizes the need for universal eye examination of all school going children. Early detection and correction of vision problem is found to have educational and behavioral benefits, and certainly enhances Quality of Life [20]. Teachers should realize the plight of the child and not unwittingly scold the child for being lazy and stupid and humiliate him persistently. Uncorrected refractive errors and other visually impairing conditions in school children can hinder education, personality development and career opportunities. Additionally, they can impose significant economic burden on the family and society. School

screening programs should be made mandatory. Conducting regular teacher training and orientation programmes along with increasing parental awareness about ocular health and nutritional requirements of children can be very helpful. Teachers can be the bridging gap between parents & ophthalmologist. The limitation of the study include coverage of a single school, detailed dilated Fundus examination on all students could not be carried out, and being conducted in an urban public school, prevalence in the underserved rural community could not be ascertained.

## CONCLUSION

The prevalence of untreated ocular morbidity in the present study was 10.6% (53 students). There was no significant difference in gender distribution. 98.1% of the ocular morbidity was correctable. Although vision is very important to people of all ages, it is more so in children as it has a key role in their mental, physical, and psychological development. Untreated amblyopia can lead to permanent visual impairment. In view of the above facts, this kind of school screening cum prevention, promotion, and treatment programme with follow-up seems to be appropriate to reduce ocular morbidity in schoolchildren.

## REFERENCES

1. Rustagi N, Uppal Y, Taneja DK; Screening for visual impairment: outcome among schoolchildren in a rural area of Delhi. *Indian J Ophthalmol* 2012; 60: 203-6.
2. Tananuvat N, Manassakorn A, Worapong A, Kupat J, Chuwuttayakorn J, Wattanikorn S; Vision screening in schoolchildren: two years results. *J Med Assoc Thai* 2004; 87: 679-84.
3. Mehari ZA, Yimer AW; Prevalence of refractive errors among schoolchildren in rural central Ethiopia. *Clin Exp Optom* 2013; 96: 65-9.
4. Robaei D, Rose KA, Ojaimi E, Kifley A, Martin FJ, Mitchell P; Causes and associations of amblyopia in a population-based sample of 6-year-old Australian children. *Arch Ophthalmol* 2006; 124: 878-84.
5. Fotouhi A, Hashemi H, Khabazkhoob M, Mohammad K; The prevalence of refractive errors among school children in Dezful, Iran. *Br J Ophthalmol*. 2007; 91: 287-92.
6. Chin MP, Siong KH, Chan KH, Do CW, Chan HH, Cheong AM; Prevalence of visual impairment and refractive errors among different ethnic groups in schoolchildren in Turpan, China. *Ophthalmic Physiol Opt* 2015; 35: 263-70.
7. Vyas DB, Lee DA; Eye conditions among 5- to 7-year-old Asian-Pacific Islander schoolchildren in Southern California. *Optometry* 2001; 72: 426-34.
8. Kalikivayi V, Naduvilath TJ, Bansal AK, Dandona L; Visual impairment in school children in Southern India. *Indian J Ophthalmol* 1997; 45: 129-34.
9. Murthy GV, Gupta SK, Ellwein LB, Munoz SR, Pokharel GP, Sanga L, et al.; Refractive error in children in an urban population in New Delhi. *Invest Ophthalmol Vis Sci* 2002; 43: 623-31.
10. Dandona R, Dandona L, Srinivas M, Sahare P, Narsaiah S, Munoz SR, et al.; Refractive error in children in a rural population in India. *Invest Ophthalmol Vis Sci* 2002; 43: 615-22.
11. Padhye AS, Khandekar R, Dharmadhikari S, Dole K, Gogate P, Deshpande M; Prevalence of uncorrected refractive error and other eye problems among urban and rural school children. *Middle East Afr J Ophthalmol* 2009; 16: 69-74.
12. Chaturvedi S, Aggarwal OP; Pattern and distribution of ocular morbidity in primary school children of rural Delhi. *Asia Pac J Public Health* 1999; 11: 30-3.
13. Nepal BP, Koirala S, Adhikari S, Sharma AK; Ocular morbidity in school children in Kathmandu. *Br J Ophthalmol* 2003; 87: 531-4.
14. Alam H, Siddiqui MI, Jafri SI, Khan AS, Ahmed SI, Jafar M; Prevalence of refractive error in school children of Karachi. *J Pak Med Assoc* 2008; 58: 322-5.
15. Goh PP, Abqariyah Y, Pokharel GP, Ellwein LB; Refractive error and visual impairment in school age children in Gombak District, Malaysia. *Ophthalmology* 2005; 112: 678-85.
16. Salomão SR, Cinoto RW, Berezovsky A, Mendieta L, Nakanami CR, Lipener C, et al.; Prevalence and causes of visual impairment in low middle income school children in Sao Paulo, Brazil. *Invest Ophthalmol Vis Sci* 2008; 49: 4308-13.
17. Maul E, Barroso S, Munoz SR, Sperduto RD, Ellwein LB. Refractive error study in Children: Results from La Florida, Chile. *Am J Ophthalmol* 2000; 129: 445-54.
18. Murthy GV, Bachani D, Gupta SK; Ophthalmology Section, Ministry of Health and Family Welfare, Govt. of India. New Delhi: 2002. *The Principles and Practice of Community Ophthalmology*.
19. Hashemi H1, Yekta A, Jafarzadehpur E, Nirouzad F, Ostadimoghaddam H, Eshtrati B; The prevalence of amblyopia in 7-year-old school children in Iran. *Strabismus* 2014; 22: 152-7.
20. Pizzarello L, Tilp M, Tiezzi L, Vaughan R, McCarthy J. A school-based program to provide eyeglasses: Child sight. *J Am Assoc Pediatr Ophthalmol Strabismus* 1998; 2: 372-4.